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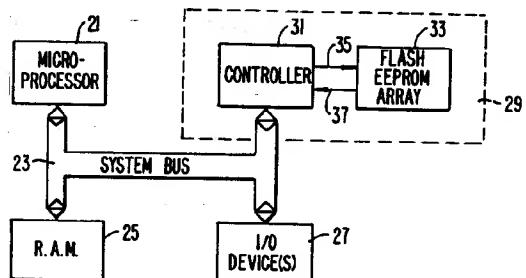
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### (54) Flash EEPROM system.

(57) A system of Flash EEPROM memory chips with controlling circuits serves as non-volatile memory such as that provided by magnetic disk drives. Improvements include selective multiple sector erase, in which any combinations of Flash sectors may be erased together. Selective sectors among the selected combination may also be de-selected during the erase operation. Another improvement is the ability to remap and replace defective cells with substitute cells. The remapping is performed automatically as soon as a defective cell is detected. When the number of defects in a Flash sector becomes large, the whole sector is remapped. Yet another improvement is the use of a write cache to reduce the number of writes to the Flash EEPROM memory, thereby minimizing the stress to the device from undergoing too many write/erase cycling.



**FIG.—IA.**

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## EUROPEAN SEARCH REPORT

Application Number

EP 90 40 0885

### DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages.	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 5)
A	COMPUTER DESIGN, vol. 28, no. 5, 1st March 1989, pages 30,32, Tulsa, OK, US; R. WILSON: "1-Mbit flash memories seek their role in system design" * Left-hand column, line 34 - middle column, line 5 * -----	1	G 11 C 16/06 G 06 F 11/20
<b>THE PRESENT SEARCH REPORT HAS BEEN DRAWN UP FOR ALL CLAIMS</b>			
<b>Place of search</b>			
THE HAGUE			
<b>Date of completion of the search</b>			
21-05-1992			
<b>Examiner</b>			
ABDALOM R.			
<b>CATEGORY OF CITED DOCUMENTS</b>			
<p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p>			
<p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			



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### CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

See Sheet B.

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-9: Selective and simultaneous block erasure in one or more IC's
2. Claims 10-29: Correcting errors in EEPROM array
3. Claims 30-55: Cache memory
4. Claims 56-62: Unsuccessful program or erasure cell substitution in EEPROM based memory card